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# DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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DISEASES of the NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

# Correlation of Neurosecretion With the Known Cause of Diabetes Insipidus

GLENN V. RUSSELL, PH.D., and GLENN A. DRAGER, PH.D.
*Galveston, Texas*

## *Introduction*

Diabetes insipidus is described as that disease in which there exists a habitual excretion of large amounts of pale urine of low specific gravity. This polyuria is the result of a deficiency of the antidiuretic factor liberated from the posterior lobe of the hypophysis cerebri. The experiments of Fisher, Ingram and Ransom[1] established the anatomical connection between the supraoptic and paraventricular nuclei of the hypothalamus and the posterior lobe of the hypophysis. They suggested that nerve impulses from these nuclei of the hypothalamus passed in the hypothalamo-hypophyseal tract via the infundibular stalk into the posterior lobe to mediate the release of the antidiuretic factor. At that time it was generally agreed that the pituicytes of the posterior lobe secreted this hormone. In 1945, however, Melville and Hare[2] isolated an active antidiuretic factor from the hypothalamus.

In 1928 Scharrer[3] had described the elaboration of "droplets" of neurosecretory material in the supraoptic and paraventricular nuclei of the hypothalamus, and later followed them along the hypothalamo-hypophyseal tract and into the posterior lobe. In 1949 Bargmann[4] demonstrated that this neurosecretory material contained the antidiuretic factor. Further experiments by Scharrer, by Bargmann and his associates, by one of us (Drager), and by others have given a clearer picture of the sites of elaboration, transport, and the release of "posterior lobe" hormones. Recently Hild and Zettler[5] have shown that the stainable neurosecretory material is a carrier substance (Trägersubstanz) for these hormones which are now known to be elaborated by the cells of the supraoptic-paraventricular complex and transported along the hypothalamo-hypophyseal tract into the posterior lobe.

It has been established that diabetes insipidus may be induced in experimental animals by several procedures: (1) destruction of the supraoptic and paraventricular nuclei bilaterally, (2) section or destruction of the hypothalamo-hypophyseal tract in the upper area of the infundibular stalk, or (3) destruction of the posterior lobe of the hypophysis including the median eminence. It is of importance to note that the anterior lobe of the hypophysis must be partially intact for diabetes insipidus to become manifest. In an experimental animal with diabetes insipidus removal of the anterior lobe will cause prompt disappearance of the diuresis. Further it has been demonstrated that in experimental animals following high infundibular stalk section and the production of diabetes insipidus there is a disappearance of neurosecretory material from the posterior lobe. Initially there is observed a "pil-

From Department of Anatomy, University of Texas, Medical Branch.

Presented before the Third Annual Meeting of the Houston Neurological Society, February 12, 1954.

ing up" of this material at the proximal edge of the lesion, but it later disappears concurrently with the retrograde changes which occur in the hypothalamo-hypophyseal tract and in the supraoptic and paraventricular nuclei.

The literature contains many reports of the pathological findings in cases of diabetes insipidus in man. There appears to be only one report (Weicksel and Cain[6]) of neurosecretory changes associated with this disease in man, however. They reported the loss of neurosecretory material from the supraoptic and paraventricular nuclei with retrograde changes in these nuclei in two cases of metastatic mammary carcinoma destroying the posterior lobe of the hypophysis and the infundibular stalk with a resultant diabetes insipidus. Metastatic carcinomas of the posterior lobe and infundibular stalk as the cause of diabetes insipidus are by no means rare as evidenced by a brief review of the literature: 15 cases reported by Fink,[7] 1 case reported by Grassmann,[8] 4 cases reported by Arnstein,[9] 4 cases reported by Biggart,[10] 1 case reported by Macchioro,[11] 1 case reported by Urechia,[12] and 1 case reported by Bernstein, *et al.*[13] It is of interest that no cases of diabetes insipidus have been reported as the result of a cerebrovascular insult, to our knowledge.

Our interest in neurosecretion and its associated phenomena, together with the report of 2 cases by Weicksel and Cain,[6] suggested the desirability of reporting on the two cases of diabetes insipidus recently seen in our hospital. We are indebted to Dr. Kenneth Earle of the Laboratory of Neuropathology of the Medical Branch of the University of Texas for supplying the brain tissue and the hypophyses for this report.

### *Methods and Materials*

The brains secured at post-mortem were fixed for about one week in 10 per cent formalin. The hypothalamus was removed as a block and divided in the midsagittal plane. After trimming, each resulting block was refixed for an additional week. The blocks were imbedded in paraffin and sectioned at 10 microns in either the sagittal or frontal plane. One series was prepared from alternate tenth sections and stained for neurosecretion by the chrome-alum hematoxylin and phloxine method of Gomori.[14] Selected sections were stained by the method of Smith and Quigley for myelin and by the buffered thionine method for cytological detail. Hild and Zettler[5] have suggested that there is some loss of neurosecretory material if post-mortem removal of the brain is delayed more than 12 hours, therefore every effort was made to secure material as rapidly as possible following the death of the patient.

### *Case Reports*

The first patient, WJN, was a 43 year old white male who had had a series of "strokes" beginning in January 1953. When first admitted on April 8 he had little or no use of the muscles on the right side of his body. He complained of a burning headache which persisted until his discharge against medical advice on May 23. An incidental observation of polyuria was made, and it was estimated on several days that he had a water intake and output of 8-10 liters per day. A urine concentration test on April 21 showed a specific gravity of 1.0096 (normal: 1.025-1.030), supporting a diagnosis of diabetes insipidus. He was readmitted to the Neurosurgical Service on August 8 and a ventriculogram was made on September 10. The patient failed to respond following this procedure and expired suddenly on September 12. Gross examination of the brain revealed marked and widespread encephalomalacia resulting from a series of thrombotic insults. The infundibular stalk appeared enlarged and the third ventricle was dilated.

Examination of sections taken through the hypothalamus revealed an old lesion in the area between the optic chiasma and the infundibular stalk. In this area there was moderate astrocytic gliosis with hyalin thickening of the walls of the penetrating arteries and widening of the perivascular spaces. The lesion is suggestive of the changes seen in passive congestion of the brain following an old thrombotic insult. In addition, some more recent changes were evidenced by the presence of early gitter cell formation. This more recent insult will be referred to again shortly. Examination of the supraoptic nucleus showed hyalin thickening of the arterial walls, pyknosis of nuclei, and cellular depopulation. There was also the suggestion of mild astrocytic gliosis, although this is a difficult matter to evaluate in a nuclear area undergoing neuron loss. There was almost complete absence of neurosecretory material within the cells of the supraoptic and paraventricular nuclei and no such material was seen in the interstitium.

In the region of the median eminence, the portion of the posterior lobe of the hypophysis which forms a part of the floor of the third ventricle, the normal cytoarchitecture had been completely destroyed. Sections showed a marked astrocytic gliosis with widespread capillary proliferation. No evidence of a hypothalamo-hypophyseal tract or of neurosecre-

tory material was seen. In the hypophysis two moderate-sized areas of coagulation necrosis were observed in the anterior lobe. These were in the region supplied with blood by the superior hypophyseal arteries. These arteries take origin from the internal carotid artery just above the diaphragma sella and accompany the infundibular stalk through its aperture into the sella turcica. These two areas of coagulation necrosis indicate a recent thrombotic insult, alluded to previously, that must have occurred three to five days prior to death. In the posterior lobe older retrograde changes were seen and it was evident that no neurosecretory material was present.

The second patient, JGS, was a 58 year old white male who had a history of extreme thirst and polyuria for some six months, and who had been diagnosed as suffering from diabetes insipidus. Posterior lobe extracts had, for a time, been beneficial. He was admitted to the Neurosurgical Service on December 16, 1953 in a confused state. Craniotomy revealed a metastatic adenomucoid carcinoma in the left parietal region. Postoperatively he ran a downhill course and died on December 24. It was reported that during this admission there was no evidence of diabetes insipidus in this patient. Postmortem examination revealed a bronchiogenic carcinoma in the right upper lobe bronchus with metastatic spread to the brain, tracheal, mediastinal, and cervical lymph nodes. There were extensive metastases throughout the cerebral hemispheres and a metastasis which appeared to have implanted in, and destroyed, the posterior lobe of the hypophysis.

Sections taken through the hypothalamus revealed a marked cellular depopulation in the supraoptic and, less pronounced, in the paraventricular nuclei together with almost a complete loss of neurosecretory material from the cell bodies and complete absence in the interstitium. In the median eminence there was marked astrocytic gliosis with capillary proliferation disrupting completely the normal cytoarchitecture of this region.

Examination of sections of the hypophysis confirmed the gross impression. The entire posterior lobe had been infiltrated by metastatic bronchiogenic carcinoma and no normal posterior lobe tissue could be seen. The tumor had, apparently, spread into the anterior lobe leaving only a very few anterior lobe cells along the anterior border of the gland.

### *Discussion*

Our observations of the absence of neurosecretory material from the supraoptic and paraventricular nuclei and the remaining undamaged portions of the hypothalamo-hypophyseal system in two cases of human diabetes insipidus agree with the findings of Weicksel and Cain.[6] Moreover, they agree with the data assembled from numerous studies upon experimental animals. That neurosecretory material is normally present in the hypothalamo-hypophyseal system of man has been clearly demonstrated by Hild and Zettler (1952)[15] and by Palay.[16]

The lesion in the first case (WJN) is interpreted as a cerebro-vascular thrombotic insult which effectively destroyed the upper area of the infundibular stalk thus severing the hypothalamo-hypophyseal tract. The lesions, therefore, interrupted the normal transport of the antidiuretic factor from its site of formation, the supraoptic and paraventricular nuclei, to the site of normal release, the posterior lobe of the hypophysis. Such a lesion corresponds exactly with one of the surgically placed lesions of choice in establishing diabetes insipidus in an experimental animal. The observed histopathologic changes and absence of neurosecretory material in the posterior lobe and in the supraoptic and paraventricular nuclei are not different from the observable results in experimental studies. To our knowledge this is the first case in which a cerebrovascular thrombotic insult has caused diabetes insipidus.

The second case (JGS), while having an etiology which has been reported previously (29 cases of metastatic carcinoma of the posterior lobe as the cause of diabetes insipidus having been cited), also appears to have unique features. The metastatic carcinoma, of bronchiogenic origin appears to have implanted in the posterior lobe, thus destroying the site of release of the antidiuretic hormone. Gliotic changes were observed in the course of the hypothalamo-hypophyseal tract, and retrograde changes accompanied by absence of neurosecretory material were noted in the supraoptic and paraventricular nuclei. These features are sufficient to account for the existence of a state of diabetes insipidus in this patient. The remission of diabetic symptoms late in the history of this patient, however, must be accounted for. Examination of the sections of the hypophysis revealed that the metastatic lesion had invaded into the anterior lobe, and had destroyed all but a very few functional anterior lobe cells. It is apparent that this invasion occurred secondarily, and this later destruction of the anterior lobe resulted in the disappearance of the diabetes

insipidus. This interpretation corresponds with the observed data from experimental animals alluded to previously.

The precise correlation of our observations in two cases of human diabetes insipidus with the data available from experiments upon animals strongly suggests that we are justified in extending our present concept of the elaboration, transport, and liberation of "posterior lobe" hormones based upon animal experimentation to the understanding of these events in man.

*Summary*

Two cases of diabetes insipidus are presented and the histopathology described. In one case a cerebrovascular thrombotic insult had destroyed the upper area of the infundibular stalk and effectively severed the hypothalamo-hypophyseal tract. In the second case a metastatic lesion had destroyed the posterior lobe of the hypophysis. In both cases neurosecretory material was absent from the hypothalamo-hypophyseal system. The precise correlation of our observations strongly suggests that we are justified in extending to man present concepts of the neurosecretory origin of posterior lobe hormones.

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# Adjustment Levels Following Transorbital Lobotomy

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Transorbital lobotomies have been performed at Longview Hospital since May 1949. As of March 1952, a total of 198 patients had been subjected to such surgery. That this number is small in relation to the total hospital population of approximately 3,300 in-patients and 700 out-patients, reflects the conservative attitude of the hospital staff toward this type of surgery. During the fiscal year 1951-52, for example, 732 patients were admitted, 19.0 per cent of this number being readmissions. During the same period, 356 patients were discharged from the hospital and an almost equivalent number of patients left the hospital on convalescent status. Except in rare instances, discharges are not granted from the hospital until the patient has made a satisfactory adjustment outside the hospital for a year or more on convalescent status.

In general, transorbital lobotomies have been reserved for the chronically ill mental patients, unmanageable individuals who have failed to respond favorably to more conservative treatment and who seemed destined for life long custodial care in an overcrowded, understaffed state mental hospital.

It is recognized that any group of patients diagnosed as psychotic is heterogeneous, even when 28 different diagnoses have been given 198 patients studied. The wide variance in diagnoses reflects the tendency of the medical staff not to pigeonhole patients. Nevertheless, the group of 198 patients upon whom this study is based approaches homogeneity in the following respects:

(a) All of the patients in this study were legally committed to Longview Hospital by the County Probate Courts in the area.
(b) All patients were legally committed as psychotic persons prior to admission to the hospital and were diagnosed as psychotic within a few weeks after admission.
(c) At the time of surgery, all of the 198 patients had been ill 2 or more years.
(d) Patients were selected for transorbital lobotomies only after they had failed to respond faforably to more conservative treatment.
(e) All surgery was performed by Doctor Douglas Goldman, Clinical Director of Longview Hospital, using the method described by Freeman.[1]
(f) Patients followed less than 6 months subsequent to surgery were excluded from the study.

From Longview Hospital, Cincinnati, Ohio.

The study is based on examinations or reports on each of the 198 patients who fulfilled the above criteria. None of the patients has been lost from contact except by death in 14 instances and escape from the hospital in 5 instances.

In an effort to avoid lengthy descriptive adjectives to indicate degrees of improvement, the patients have been classified in various adjustment levels. Inasmuch as a psychosis is a way of life which produces disability mostly on socio-economic levels, this aspect has been given considerable weight in the evaluation. The latter was done jointly with Doctor Francis M. Stephens, Senior Psychiatrist.

*Adjustment Level I* (No employment, disturbed behavior, no resocialization): These patients remain hospitalized and are problems from the standpoint of nursing care and supervision because of untidiness, assaultive behavior or suicidal tendencies. Most of them dress with urging and feed themselves, but contribute nothing to the welfare of others although none are bedridden or unable to walk.

*Adjustment Level II* (No employment, adequate behavior, no resocialization): This is the passive-dependent group. These patients remain entirely dependent, contribute nothing to the welfare of others, but are not problems from the standpoint of untidiness, assaultive behavior or suicide.

*Adjustment Level III* (Partial employment, adequate behavior, moderate resocialization): These patients work at simple tasks under supervision, make a reasonable adjustment to institutional life, and are useful hospital detail workers. Many are permitted to visit with relatives, but require nominal supervision at home. None, however, are regularly employed in a gainful occupation.

*Adjustment Level IV* (Adequate employment, adequate behavior, adequate resocialization): These patients are (1) regularly employed outside the hospital or (2) have resumed the responsibilities of homemaking upon their return to the community stream.

Table I shows the adjustment levels as of July 1952 of the 179 known patients. A comparison between Tables I and II indicates

reasons why little or no improvement could be attained when taking into consideration the duration of mental illness prior to performance of transorbital lobotomies. A total of 23.7 per cent of the patients studied were readmissions, 4.7 per cent higher than the readmission rate for the fiscal year, although it can be clearly understood that many of the patients included in this study had been hospitalized continuously after the onset of mental illness.

TABLE I

ADJUSTMENT LEVELS AS OF JULY 1952

| *Level* | *Number* | *Percentage* |
|---|---|---|
| I | 64 | 35.8 |
| II | 59 | 32.9 |
| III | 27 | 15.1 |
| IV | 29 | 16.2 |
| TOTAL | 179 | 100.0 |

TABLE II

ADJUSTMENT LEVELS AS TO DURATION OF ILLNESS PRIOR TO SURGERY

| | 2-5 Years | 6-10 Years | 11-15 Years | 16-20 Years | 21 Years & Over |
|---|---|---|---|---|---|
| Deceased | 6 | 3 | 2 | 0 | 3 |
| Escape | 3 | 1 | 1 | 0 | 0 |
| Level I | 15 | 17 | 11 | 14 | 7 |
| Level II | 19 | 18 | 13 | 5 | 4 |
| Level III | 10 | 7 | 7 | 1 | 2 |
| Level IV | 7 | 16 | 3 | 3 | 0 |
| TOTAL | 60 | 62 | 37 | 23 | 16 |

The majority of the patients were mentally ill for less than 10 years. More improvement was seen in this group; yet improvement was noted even after almost 20 years of mental illness in some cases.

In Table III the cases are analyzed according to educational levels prior to onset of mental illness. The majority of the patients in the study had completed grade school and better results were obtained in this group. Presentation of the intelligence quotients was first considered and then discarded. The reason for this is that many patients, prior to transorbital lobotomies, were inaccessible to psychological testing. Others had been hospitalized before the establishment of the modern psychology department at the hospital. Therefore, since all patients could not be included, it was decided to omit consideration of intelligence quotients altogether and substitute instead, the educational background prior to admission.

Insofar as was possible, it was considered essential that careful histories be taken and estimate made of the patient's personality, his relation to his environment, and to the family constellation and familial diseases. Specific criteria involved in the history taking were as follows: (a) noting the length of adjustment periods in the patient's life; (b) determining if the adjustment periods were commensurate with his intellectual and economic status; (c) determination if, in the patient's objective relationships, the objectives were at a sufficiently good level, and of a repetitious pattern; (d) determining the dependency and passivity of the patient and noting the secondary gains from his particular illness; (e) noting the rigidity of his personality structure; (f) observing any self-damaging tendencies of the individual and how properly channelized these tendencies were.

TABLE III

ADJUSTMENT LEVELS AS TO EDUCATIONAL LEVELS PRIOR TO ONSET OF ILLNESS

| | 4th Grade or Less | 5th-8th Grade | 9th-12th Grade | College |
|---|---|---|---|---|
| Deceased | 1 | 9 | 4 | 0 |
| Escape | 0 | 1 | 2 | 2 |
| Level I | 10 | 27 | 22 | 5 |
| Level II | 5 | 21 | 28 | 5 |
| Level III | 3 | 11 | 10 | 3 |
| Level IV | 1 | 5 | 19 | 4 |
| TOTALS | 20 | 74 | 85 | 19 |

Schizophrenia, paranoid type, was the most frequent diagnosis of patients included in this study with schizophrenia, hebephrenic type following closely.

Mrs. B., on convalescent status from the hospital, is a typical paranoid schizophrenic. At the time of her original admission, lacking in understanding and in an effort to have her come peacefully to the hospital, her husband told her she was to remain only overnight for the extraction of a tooth. Instead, she remained hospitalized for 2 years and had a transorbital lobotomy. Now, although welcoming the social worker in her home, she is naturally reluctant to return for periodic visits to the hospital. She expressed the belief to the worker that planes flying overhead give her adequate super-

vision and that President Truman may call her at any moment to make a world-wide tour on an ultra-secret mission. She accuses neighbors, who fortunately live almost a mile away, of placing acid on the chains of a swing in her backyard, causing it to break when she sits in it, refusing to accept the fact that this is due to her weight since the swing does not break when her children swing in it. Her home was neat and the children, a boy and girl of school age, are well cared for. We questioned the effect on the children of such delusional thinking as she exhibited. However, the County Welfare Board worker, the Public Health nurse, the principal of the school, and the parish priest, all assured the worker that Mrs. B's presence in the home was not emotionally disturbing to the children, since it appears that both the children and Mr. B accept Mrs. B's limitations. Cooperative casework with all these agencies, plus the family's acceptance of Mrs. B, permits her to remain outside the hospital.

"After all," says Mr. B, "You should have seen her *before* she came to the hospital and had that treatment."

Table IV shows the amount of shock therapy which the patients in this study had prior to surgery. Noyes[2] states: "Before introduction of electric shock therapy about 40 per cent of cases of involutional melancholia recovered. Convalescence, however, was slow and those who recovered were frequently ill 2 or 3 years. With the use of electric shock therapy more than 90 per cent of them showed prompt recovery." Judging by the amount of treatment given prior to performance of transorbital lobotomies, it can clearly be shown that in the majority of instances, this study was concerned with those who failed to respond. In many instances, in addition to the shock therapy shown in Table IV, similar treatment had been given at other psychiatric treatment centers prior to coming to Longview Hospital. The number of such treatments, however, was not included in this study.

The totals listed in Table IV show combined shock therapies; therefore, since a patient may have had a combination of electroshock and insulin shock they are shown in respective headings.

While some patients appear to have had no previous treatment prior to surgery, other patients have had considerable treatment from many sources. Marie is one such patient.

Despite a family background studded with neuropathic traits, Marie's father believes that her difficulties arose when, as a senior at a universiy, she

TABLE IV

ADJUSTMENT LEVELS RELATED TO AMOUNT OF SHOCK THERAPY RECEIVED PRIOR TO SURGERY

| | Deceased | Escape | Level I | Level II | Level III | Level IV | Total |
|---|---|---|---|---|---|---|---|
| **None** | | | | | | | |
| Insulin | 8 | 2 | 33 | 23 | 14 | 15 | 95 |
| Electric | 3 | 0 | 11 | 5 | 2 | 1 | 22 |
| Metrazol | 11 | 5 | 58 | 56 | 26 | 27 | 183 |
| Total | 2 | 0 | 7 | 2 | 2 | 1 | 14 |
| **Less Than 25** | | | | | | | |
| Insulin | 0 | 0 | 2 | 0 | 0 | 2 | 4 |
| Electric | 7 | 2 | 13 | 23 | 12 | 8 | 65 |
| Metrazol | 3 | 0 | 6 | 3 | 1 | 2 | 15 |
| Total | 3 | 0 | 6 | 7 | 6 | 5 | 27 |
| **26-50, Inclusive** | | | | | | | |
| Insulin | 0 | 1 | 5 | 5 | 5 | 1 | 17 |
| Electric | 4 | 2 | 21 | 22 | 7 | 14 | 70 |
| Metrazol | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 2 | 2 | 11 | 8 | 5 | 8 | 36 |
| **51-100, Inclusive** | | | | | | | |
| Insulin | 6 | 1 | 22 | 28 | 6 | 11 | 74 |
| Electric | 0 | 1 | 12 | 6 | 6 | 5 | 30 |
| Metrazol | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 6 | 1 | 29 | 30 | 9 | 11 | 86 |
| **101-150, Inclusive** | | | | | | | |
| Insulin | 0 | 1 | 2 | 2 | 2 | 0 | 7 |
| Electric | 0 | 0 | 4 | 3 | 0 | 0 | 7 |
| Metrazol | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 1 | 2 | 8 | 8 | 3 | 3 | 25 |
| **151-200, Inclusive** | | | | | | | |
| Insulin | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Electric | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| Metrazol | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 2 | 2 | 2 | 0 | 6 |
| **Over 200** | | | | | | | |
| Insulin | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Electric | 0 | 0 | 1 | 0 | 0 | 1 | 2 |
| Metrazol | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 1 | 2 | 0 | 1 | 4 |

innocently asked the professor, "Can one become pregnant by kissing?" The entire class, including the professor, laughed. This caused Marie considerable embarrassment, and precipitated her mental illness. The father goes on to say, however, that Marie should be considered a war casualty. He justifies this statement by telling how Marie in 1936 visited Hitler's Youth Camps on a trip to Germany. Nothing in particular is known to have occurred, but the father believes conditions there shocked Marie so that she became emotionally upset and was treated by a Viennese psychoanalyst. Returning to the United States, Marie was given metrazol treatments by a private psychiatrist and on two separate occasions went to a private hospital for several months. After this she was at a psychiatric clinic

in Kansas for almost a year and on her return home again went to a private hospital for close to another year. Throughout this period, Marie was subjected to various types of treatment and then was admitted to a university hospital where lesions were produced on two different occasions in the dorsomedical nuclei of the thalamus by electrolysis. After a slight degree of improvement for a short period, Marie again became unmanageable and was admitted to another psychiatric treatment center in Philadelphia where histamine treatment was administered. The same type of treatment was administered at another hospital in New York. On her return to Ohio, a private physician was consulted and three special nurses were employed. Histamine phosphate, testosterone and ovocylin were prescribed without appreciable result. Marie continued to remain delusional, believing her father and mother to be King and Queen of England and preventing her marriage. Marie was finally committed and sent to Longview. After a transorbital lobotomy, she showed improvement for almost a month and then reverted to her old behavior, with delusional thinking, and was at times actively combative. Subsequent to lobotomy, a further course in electro-shock therapy was initiated. Marie went home on convalescent status, adjusting for some time, helping with the housework, sewing, and playing the piano. She had a reversal and was returned to Longview. Her father then financed an experimental group psychotherapy project. Marie participated as part of the group, doing occupational and recreational therapy in an overall push therapy method, swimming, going on picnics, etc. Once voted the best all-around junior student at the university, Marie still remains at adjustment level I and takes a peculiar delight in scooping up objects in magpie fashion and upsetting the hospital plumbing by stuffing the material into ward toilets.

Many of the patients now rated at adjustment levels I and II are receiving various types of shock therapy subsequent to surgery. Often this combined type of treatment brings about a change in adjustment levels for brief periods. Booster shock treatments often permit the patient to remain at a higher level of adjustment. Nevertheless, the levels shown in this study are those at which the individual patient most consistently was, as of July 1952.

Of the 198 patients studied, Table IV shows that 14 patients did not receive any type of shock therapy prior to performance of the transorbital lobotomy because of physical contraindications or, because the medical staff did not believe such treatment to be beneficial. The highest number of shock treatments given any patient prior to surgery was 259. This patient was 68 years old, the second oldest one in the group studied, when transorbital lobotomy was performed, after repeated shock therapy appeared to be lacking in lasting effectiveness.

Mrs. H. is now 70 years of age and was discharged from the hospital after having successfully completed a year's convalescent status and showed her ability to adjust. When last seen, she stated, "Do you know, I think life begins at 70? I swear, this has been the happiest year of my life!"

Table V shows the ages of patients at the time of the performance of transorbital lobotomy. The youngest patient in the group studied was 17, the oldest 69.

## TABLE V

### ADJUSTMENT LEVELS AS TO AGE IN YEARS AT THE TIME OF TRANSORBITAL LOBOTOMY

| | Under Age 20 | 21-29 | 30-39 | 40-49 | 50-59 | 60 Years & Over |
|---|---|---|---|---|---|---|
| Deceased | 1 | 2 | 2 | 5 | 1 | 3 |
| Escape | 0 | 1 | 2 | 2 | 0 | 0 |
| Level I | 2 | 13 | 23 | 16 | 7 | 3 |
| Level II | 3 | 10 | 26 | 14 | 4 | 2 |
| Level III | 1 | 3 | 8 | 9 | 6 | 0 |
| Level IV | 1 | 4 | 8 | 9 | 4 | 3 |
| TOTAL | 8 | 33 | 69 | 55 | 22 | 11 |

Carl, the youngest patient, was diagnosed as a juvenile schizophrenic. The oldest of 4 children, Carl felt lost in the shuffle. His father invariably prefaces interviews with the social worker by offering an expensive cigar and through a figurative smokescreen recounts that the family lives in furnished rooms after 20 years of married life because of his "bankruptcy several years before." When Carl comes home on visits, his sister has to sleep on a chair since he sleeps in her bed. From an early age, Carl had contributed all his earnings to the family and he had to steal some wanted object and then run away from home to escape the consequences. His father would beat him severely, and his mother, somewhat mentally retarded, would be unable to protect him from the father. Showing many fantasies and hallucinations, Carl was committed to Longview when 15 years of age. Shock treatment offered little appreciable improvement and a lobotomy was performed. Subsequent to this, Carl escaped, stole a car and was apprehended in Tennessee. Several months later, after he had shown ability to adjust at the hospital, a family care home was found for him. The family care parents, warm, outgoing, tolerant people, gave him the affection he had long craved but had never before obtained. Carl says of the family care mother, "She should be on that television program called 'What's

My Line,' you know that ? Nobody would guess that she hauls garbage."

Carl worked at the family care home, gradually earning money, gained weight, and gave evidence of greater maturity than he had ever shown. Circumstances caused the family care couple to lose their concession of garbage hauling, and they had to move away. Although we assured Carl that we were making other plans for him, he again stole an automobile and was once more apprehended. Carl was considered sane and held accountable for his actions and is serving a prison sentence for the car theft.

Mr. M., the oldest patient in the study, prior to admission to the hospital believed himself to be a chosen servant of God, and that his wife, daughters and daughter-in-law were prostitutes. He continually ran away from home, and hitch-hiked by using the technique of slapping a brief case against the side of a passing car, causing the driver to think he had hit Mr. M. and he would stop the car. In the hospital he was belligerent toward other patients, attendants, and his family when they came to visit him. After transorbital lobotomy he showed considerable improvement, was granted convalescent status and went with his son to California. Prior to admission to the hospital, he had been a cashier, but his son obtained employment for him in a real estate office. We heard periodically that he was adjusting. After he had been out of the hospital for a year, we received the following letter from his employer:

"About 2 months ago as an acid test, and to ascertain if his recovery was complete, I sent him to Middletown, Ohio, and all reports from there were 100%. While working here, he has acquired many friends and has been of great help in the opcration of the business. We have a force of 14 salespeople and an older head such as his has a definite advantage in the successful guidance of younger salesmen. It is in this capacity that his efforts have been so advantageous to us. . . ."

Lena was admitted to Longview after having had a pre-frontal lobotomy elsewhere and when she appeared before the medical staff, screamed, "I don't care how many lobotomies I have, or how many you give me! I'll still hate my mother!"

Often, however, it becomes extremely difficult to have patients' families accept the patient when, after a course of treatment, there has been considerable improvement. Families are inclined to remember the patient as he was prior to hospitalization rather than as he becomes after a course of treatment. Tom's case is typical.

During Tom's hospitalization, his wife moved away with their four small children and resumed employment as a nurse. Our efforts to do case work via correspondence proved fruitless as she was work via correspondence proved fruitless. Her attorney finally answered for her.

". . . Mrs. R. will not now nor in the future agree in any way whatsoever for the release of her husband from your hospital for the following reasons:

1. Her husband is known to have homicidal tendencies.
2. She is financially able only to support herself and her children and is not in a position to take on the care of his convalescence.
3. The two younger children are under doctors' care and the advice of these doctors is that under no circumstances should the husband return to the home. Both of these children are suffering from an acute nervous condition brought on in large measure by his actions prior to his being admitted to your institution.

Because she works all day and her children press upon her inquiries in regard to any mail she receives from Ohio, we are asking your cooperation in that you direct any further communication in regard to this matter to our office . . ."

Tom had been working on a responsible detail at the hospital for quite a few months and had been doing satisfactory work in the hospital commissary. His brother was seen by Social Service. Although Tom and his brother had not been close since Tom's marriage our efforts to reestablish a close relationship between the two, were successful. Through the assistance of the vocational psychologist at the hospital, a job was obtained for Tom. He worked for several weeks, going back and forth from his job while living on the hospital grounds, adjusting well. Pleased with his adjustment, his brother then invited Tom to live in his home. Tom came weekly to Lamplighter meetings, an organization of former mental patients which Social Service had founded at the hospital. Tom has now been on convalescent status almost a year. We have assured him that when he has shown adjustment for a little longer we will see if it is not possible for him to visit his children. He writes regularly, sends little gifts, not directly, but through the social worker who relays them on to the lawyer, although the wife remains adamant and refuses to write. Cooperative casework with a Michigan agency thus far has not changed the wife's opinion. She still remembers Tom as he was prior to hospitalization, despite his adjustment.

Tom represents the patient of middle-age on whom a transorbital lobotomy was performed. He was 35 at the time of surgery.

Table VI shows the length of follow-up observation. Of the 14 deceased patients two died the day following surgery, one died two days following surgery, two within a period of two weeks subsequent to surgery, one a month after surgery, one died nine months later, one 10 months later, two 11 months later, and three died 18 months later. This

clearly indicates that while there are risks involved, only a small number of the patients died from complications following surgery.

Causes of death were as follows:

| | |
|---|---|
| Undetermined natural causes | 1 |
| Pyopneumo-thorax | 1 |
| Carcinoma of the lungs | 1 |
| Carcinoma of the rectum | 1 |
| Apoplexia | 1 |
| Hypertensive Heart Disease | 1 |
| Acute bronchitis | 1 |
| Suicide by strangulation | 1 |
| Phenol poisoning | 1 |
| Subdural hemorrhage | 1 |
| Cerebral hemorrhage | 4 |
| TOTAL | 14 |

Mr. C., whose cause of death was phenol poisoning, died under mysterious circumstances. Somewhat paranoid he believed someone poisoned his food, he had to be coaxed to eat, and what he feared actually came about when someone placed phenol in the eggnog which was in the ward refrigerator. The culprit was never discovered.

Mrs. A. had carcinoma of the rectum at the time of surgery. It was believed, however, that despite an awareness that her illness might be terminal, performance of a transorbital lobotomy was justified in that this made her remaining months more lucid and from the standpoint of morale and that of her relatives, it appeared the wisest thing to do in the opinion of the medical staff.

Table VI shows that the largest group of patients in this study has been followed over a period of 2 years.

If the seven patients who died in less than 6 months are not included in this study, the levels of adjustment of the remainder of the group would be good. However, as a matter of validity, it was believed necessary to include the fatalities.

## TABLE VI

### ADJUSTMENTS LEVELS AS TO NUMBER OF MONTHS ELAPSING SINCE SURGERY

| | Less than 6 | 6-12 Months | 13-18 Months | 19-24 Months | 25-36 Months | 37 Months & Over |
|---|---|---|---|---|---|---|
| Deceased | 7 | 4 | 3 | 0 | 0 | 0 |
| Escape | 0 | 1 | 1 | 2 | 1 | 0 |
| Level I | 0 | 4 | 8 | 13 | 31 | 8 |
| Level II | 0 | 4 | 10 | 5 | 31 | 9 |
| Level III | 0 | 8 | 3 | 3 | 9 | 4 |
| Level IV | 0 | 6 | 1 | 3 | 19 | 0 |
| TOTAL | 7 | 27 | 26 | 26 | 91 | 21 |

Mr. P., an escaped patient, is typical of the problems facing the institution. Mr. P. first went home, threatened his wife, and then fled to Maryland. His exact whereabouts were unknown for several months until a social agency in Baltimore advised us, that he had contacted them. They believed him suicidal. He was transferred back to us but thereafter he again ran off and registered at a hotel under an assumed name. He was finally located and returned to us. In the meantime, his former employer communicated with us, suggesting that he would like to have Mr. P. resume his work. The employer was sure Mrs. P. was not interested in her husband's welfare and that she would prefer that he remain in the hospital. This necessitated a job of interpretation to the employer, explaining to him that we had a dual responsibility, both to the patient and to society and that medical opinion was that Mr. P. was not ready to leave the hospital. Although Mr. P. could function reasonably well within limitations as a carpenter, after completion of the job, and during the other 16 hours of the day when he was unoccupied, he acted out many of his fantasies. We complimented the employer on his loyalty and expressed our hope that he could see that in a public hospital we too, desired to have Mr. P. leave as soon as possible.

The majority of patients in Levels II and IV have been followed for over 2 years after surgery. The trend indicates improvement, with conjunctive therapy, and the passage of time. Longview Hospital, a pioneer in the use of metrazol, insulin, and electro-shock therapy, and reluctant to have patients remain in adjustment level I, is now employing a drug recently found helpful in tuberculosis and which had given indications that it might be of value in treatment of some mental illnesses.

In a study by Weickhardt and Duval[3] at Saint Elizabeth's Hospital, of 45 patients who had prefrontal lobotomies the authors report interesting comparisons between these patients and others who had transorbital lobotomies, a more simple surgical procedure. In the Saint Elizabeth study, nine per cent of the patients fell within Level IV as compared to 16.2 per cent in this study—an increase of 7.2 per cent. Level III, however, showed 19.0 per cent of the Saint Elizabeth patients as opposed to 15.1 per cent of the patients in the Longview study. Of Level II, there were 12.1 per cent more prefrontal lobotomy patients than the patients having transorbital lobotomies, while 22.8 per cent more of the transorbital patients remained

at Level I as compared to the prefrontal lobotomees.

Patients ill from 2 to 5 years who had prefrontal lobotomies at St. Elizabeth's showed improvement within Level IV in 3.7 per cent more cases than the transorbital lobotomees at Longview. However, those at Level IV in our study, ill 6-10 years, improved in 25.8 per cent more cases than those in the St. Elizabeth study. Those at the Level IV who had been mentally ill for 11-15 years, however, showed more improvement in 1.9 per cent cases after prefrontal lobotomies and 7.0 per cent more improvement in the group ill 16-20 years.

As the St. Elizabeth's study of prefrontal lobotomies was made on schizophrenics only, no useful purpose would be served by a comparative diagnostic study since our study is concerned with patients having 28 different diagnoses. Although catatonics or mixed types of reaction seemed to offer better prognosis than those of hebephrenic or paranoid types, the Longview study contained more patients in the groups offering poorer prognosis.

Only 7.1 per cent of the Longview patients had no previous treatment while 44.4 per cent of the St. Elizabeth patients had had no treatment prior to surgery.

St. Elizabeth had no patients under the age of 20 while 12.5 per cent of the Longview patients under the age of 20 were in Level IV. In the age range 21-29 there was 0.0 per cent from St. Elizabeth's and 12.1 per cent from Longview. While 10.7 per cent of the St. Elizabeth patients in Level IV were between ages 30-39, 11.6 per cent were in this age range in the Longview study. At Longview 18.2 per cent were between the ages of 40-49 as compared to 10.0 per cent in the Saint Elizabeth study at Level IV. In St. Elizabeth's study none were between ages 50-59 years in Level IV as compared to 18.2 per cent in the Long view study; 27.3 per cent in the Longview study were over 60 years but Saint Elizabeth's study revealed no lobotomies on patients in that age group.

Based on the results of 198 patients who have had transorbital lobotomies at Longview and who have been followed for 6 months or longer, conclusions must at best, be considered tentative. Notwithstanding, the homogeneity of the group helps toward their validity.

If one considers that prior to surgery all of the 198 patients would have fallen into level of adjustment I the overall improvement in behavior is striking. Patients changing from aggressive, assaultive, and combative behavior, or vegetative existence, requiring close and constant supervision in an overcrowded understaffed state mental hospital, often return to the community and become productive citizens. Most of those remaining in the hospital are now decently clothed, eat with other patients, attend amusements, are more tractable, and are no longer dangerous to the ward personnel. The percentage showing the number of patients able to work on hospital details, as well as those making extramural adjustments, indicates that treatment which would salvage the patients that this study discloses, is worth while. It is particularly interesting to note that the treatment had proved effective in some cases irrespective of age, length of illness, educational achievement, and obstacles placed in their paths by families who refused to accept the fact that a person can recover from a mental as well as from a physical illness. At any rate, an attempt has been made to keep in mind the wisdom of Seneca: "We may lay it down as an invariable axiom in all high education that it is never sensible to permit that which is bad for the supposed sake of preventing what is worse."

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# Continued Insulin Coma in Schizophrenia

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A review of the literature reveals that fourteen series of cases representing more than 4,000 insulin treated patients[1,2] showed consistently a rate of improvement of approximately 70% and the range spread of reported improvement was from 52% to 88%. The variables of age difference, chronicity of disease, methods used, adjunctive therapies used, relapses, number of treatments, and standards for the determination of the degree of improvement appeared hopelessly complicated and beyond methods of statistical evaluation. One factor alone that can be concluded from these published cases is the almost certain knowledge that at least 50% were improved irrespective of sub-classification, chronicity of disease, or methodology involved. Comparative figures with spontaneous improvement or those affected by relapse as reported in such series[3,4,5] also seemed complicated by a definite group of variables and in most instances the methods of the course of treatment appeared to be inadequately definted. It is felt that the discussion of the following case would possibly have considerable bearing on the matter of relapse and likewise be considered as an important factor in distinguishing between acute and chronic schizophrenia.

*Case History*

This recovered patient received a total of 302 insulin comas along with more than 45 electroshocks. Twenty-nine of the ECT's were given in combined form with insulin. The initial course of insulin was given November 16, 1950, to February 23, 1951, and was of the usual conventional duration of 68 comas. There was a very short period of improvement following this course of treatment. The patient quickly regressed once more to a hopeless negativistic state. His condition had so worsened that life was threatened by mal nutrition and critical vegetative responses. ECT was again attempted but after 14 shocks it did not appear to alter his adaptations sufficiently and he was started once more on insulin coma therapy January 14, 1952. During the last year he received constant insulin coma therapy, five times weekly, for a total of 234 treatments. After approximately seven months of treatment his improvement became obvious and constant. Combined ECT and ICT was discontinued October 24, 1953. Stepped up activities were then provided for the patient and his adaptive behavior for the first time became friendly, spontaneous, and cooperative. At this point in therapy his mal-adaptive responses were no longer evident and it became obvious that he was able to replace stereotyped schizophrenic behavior with a more fluid adaptation to the current realities of his environment. The next step was to determine if desocialization had progressed to the point that even with improved interpersonal relations he would find it impossible to conform to social conventions. On Thanksgiving he was given his first pass home and got along extremely well. He continued daily treatments and trips to his home were arranged for the Christmas and New Year holidays. During these trips he renewed most of his old acquaintances and displayed normal gregarious instincts as well as a definite resumption of affectionate interpersonal relations with his family. Insulin coma therapy was discontinued on January 16, 1953. The patient was then placed on the open ward of the hospital where his adjustments have continued to be completely proper and daily interviews over a period of one month have revealed definite signs of complete recovery with development of good insight. He is being continued on the open ward with a full schedule of planned activities and is showing concentrated interest and skillful adaptation.

*Case History*

J. G., age 28. The family history showed no instances of psychoneurotic or psychotic disturbances. Patient was the oldest in a sibship of three boys. The father is self-employed in business and the mother a school teacher. The family was a closely united unit of moderate circumstances. The birth and early formative years of the patient appeared

completely normal. He differed from his brothers only in that he had pronounced asthetic interests and always appeared shy and had few intimate friends. Throughout his school years he was a good student but social activities were extremely limited and he had few contacts with members of the opposite sex. During his high school years his chief interest was in dramatics and he seemed to derive a particular satisfaction in the directing of plays and arranging of scenery. He entered the Army immediately after graduation in May 1943. He served in the Air Corps as a mechanic and was discharged from the Army, March 4, 1946. There was only one short period during this Army career when he showed some emotional change which was attributed to unusual homesickness. Immediately upon discharge he returned to his home for one year. During this time the family noted that he was more withdrawn but nothing overt was noted in his behavior. He then went to California presumably to attempt to find work in dramatics. While there he did all types of odd jobs and in June 1949 was first seen by a psychiatrist who was of the impression that he was showing signs of incipient schizophrenia or severe obsessive, compulsive neurosis. At this time he became quite careless in his personal habits and on numerous occasions was found wandering about apparently disoriented. Arrangements were made for his transportation to his home in West Virginia. Shortly after arriving home he became confused, impulsive and on occasions threatened violence, and was admitted to this hospital November 1950. This patient's course in the hospital over a period of approximately two years was that of a severely regressed hebephrenic schizophrenia. His affect was completely inappropriate at all times and he gradually developed complete disorientation with continuous silly behavior and constant hallucinosis. From time to time he would show unstructured paranoid trends. He would curse all institutions, races, and creeds of people. In view of his complete withdrawal and negativism it was necessary to force feed the patient most of the time. Attempts were made to handle him on wards providing group activity but in every instance it was necessary to return him to the seclusion ward when his regressive tendencies became marked. His behavior alternated between regressive negativism and agitated assaultive episodes. The first evidence of any change as mentioned above occurred about July 1952. After several months of treatment he seemed eager to establish satisfactory interpersonal relationships. However, it was not until September 1952 that his attitude towards others had become sufficiently consistent to allow an expansion of his activity program. From this time on there was a continuous improvement in all spheres until insulin treatment was finally discontinued January 16, 1953.

Over the past five years we have used the modified method of insulin coma therapy as originally used at the Pennsylvania Hospital in Philadelphia by Bond and Shirley. Insulin is given at 7 A.M. and terminated usually after one hour of satisfactory coma at approximately 10:15 A.M. Insulin treated patients are kept on the group activity ward when improvement is sufficiently evident to avoid risks of a general nature. The insulin group are then provided with a separate activity program that is entirely unscheduled and so variable that the needs of all can be met. The treatment team consists of a psychiatrist, two nurses specially trained and three selected aides that have received some training in the techniques of therapy as well as recreational supervision. Deep coma doses are rapidly approached and after alternating the dose in zig-zag fashion a satisfactory coma dose is maintained. In this instance the patient required 150 units of insulin and there was nothing unusual about his coma with exception of the observation that he constantly showed marked torsion spasms and rigidity. There were very few occasions when the patient showed an early excitement period. His coma was usually interrupted rapidly by intravenous glucose. All patients on insulin therapy are given a battery of psychological tests and an electroencephalogram before treatments are started. These studies are then repeated at the termination of therapy. In this instance very little change was noted in the brain wave pattern, the usual small percentage of delta waves were encountered. The psychological studies have confirmed the clinical signs of recovery.

*Summary and Conclusions*

(1) A case of clinical recovery is reported in a serious hebephrenic schizophrenia. Exceptions to the reporting of one case is anticipated but due to the unprecedented technique of dangerous continued insulin coma therapy this case should be reported for critical analysis.

(2) Careful study of more than 4,000 insulin treated cases reveals only one remarkable conclusion and that is the fact that 70% may show some form of improvement regardless of all other inconsistencies reported.

(3) The successful treatment of schizophrenia may require physiological therapy in conjunction with properly applied activities and psychotherapy over a longer period of

time in order to remove the psychotic barriers and allow normal adaptive behavior to be steadily conditioned into non-reversable normal behavior.

(4) Conceptions of separate treatment phases for the acute intensive and continued treatment of schizophrenia may be improperly conceived.

(5) This heroic procedure should be applied to groups of severely chronic schizophrenia of proper age group and representative of all sub-groups so that a clearer interpretation of the chronicity of schizophrenia can be determined. Previous skepticism regarding the use of insulin coma therapy based on comparisons with spontaneous recovery rates and incidents of relapse following treatment is not validated unless the courses of treatment given are performed adequately and prolonged adjunctive therapies properly conducted along with courses of treatment.

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Author's Note: The foregoing report was reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

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# Combined Pitressin and Electric Shock in Schizophrenia

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The use of pitressin in the treatment of schizophrenia has been reported as early as 1937[1] and more recently in 1951[2,3] and 1953.[4] The nature of these reports was intended to be of preliminary character because of the generally known difficulties connected with reporting progress in a case of schizophrenia, including difficulties in selecting an adequate control group, evaluating and screening the numerous variables that have an influence on the course of the disease. Based not so much on solid statistical evidence, but more on clinical impressions, we had arrived at the conclusion that chronically administered pitressin is able to change the course of schizophrenia.

The theoretical background of this treatment is a hazy one. Our thinking has undergone great changes since the first working hypothesis. The stimulus for these investigations originated from the first working hypothesis of Meduna for the introduction of the convulsive treatment of mental diseases. Starting with the assumption that there is a biological antagonism between schizophrenia and epilepsy, he attempted to make schizophrenics epileptic by various means, one of them being metrazol, which was later on replaced by Cerletti and Bini with the electro-convulsion. While analysing the pertinent literature, two sets of data came into the focus. The one was grouped around the observation of McQuarrie, who found that epileptics are more prone to convulse in a state of hydration and conversely the convulsive activity decreases if the patient gets dehydrated. Going back to the first working hypothesis of Meduna, the findings of Hoskins concerning the water metabolism of chronic schizophrenics seemed to harmonize with Meduna's thoughts about the biological antagonism insofar as Hoskins had found that the water turnover of chronic schizophrenics is about twice as large as that of normals. In other words the more over-

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From North Carolina State Hospital at Butner.

hydrated the epileptic becomes the more epileptic manifestation could be expected, whereas the schizophrenic appears to get more and more dehydrated as the process goes on and to counteract this inability to accumulate water, a higher turnover will result. At this point it was felt that it may be worth investigating whether increased level of hydration would not produce epileptic convulsions in schizophrenics, or would any such effort of making a schizophrenic's water metabolism more similar to that of an epileptogenic condition, change the clinical course of the schizophrenic process. The whole procedure was looked upon as just another method of provoking convulsions especially since forced hydration with pitressin has become an accepted method of diagnosing latent epileptic conditions. The first few patients placed on this regime of increased water intake and pitressin, however, have not shown the expected convulsions. On the other hand, there appeared to be some change, in fact, fairly obvious remissions as far as schizophrenic symptomatology was concerned. This gave encouragement toward trying it on a larger scale in 1943[5] and later on in 1950. Partly in order to gain evidence for the working hypothesis, cases treated with pitressin were tried on a combination of pitressin and metrazol. A reduction was seen in the needed quantity of metrazol for the convulsion, the difference amounting to 10 to 20 per cent in the convulsive dose of metrazol. An increase in intensity of convulsion was also seen in this same group, and again the clinical impression was that the amount of clinical improvement had increased. This data again seems to be in favor of the hypothesis that, the closer you put a schizophrenic to the epileptic metabolic pattern the more improvement may be expected.

The idea of this biological antagonism has been tackled since by various investigators and the original hypothesis of Meduna has become less tenable. But on the other hand, various other investigations seem to support the suspected need for shifting to the positive direction as far as water metabolism is concerned in cases of schizophrenia.

The second group of pertinent data comes from the investigations in the area of stress and metabolic response to stress. This seems to indicate that under stress, especially mental or emotional, the body responds in a rather typical way, one of the phenomena being water loss amounting to 2-300% in normals and possibly a great deal more in schizophrenics, according to the Worcester Group. The exact nature of the factors responsible for this, and the mechanism of operation have not been adequately investigated; but this finding alone can be regarded as some indication of water playing a large role in the universal metabolism whenever the body has to deal with stress. Without trying to indulge in over-simplifications, it still can be suspected that an interference with this metabolic process that seems to go into the negative direction, an attempt to push it back or retard it, may result in an increased stress tolerance. In spite of the fact that everybody seems to focus on the anterior pituitary, Selye himself made several references in his writings to the need of investigating the posterior pituitary. This especially since in his opinion the posterior pituitary may play a larger role whenever it comes to handling a mental or emotional stress, whereas stresses of physical nature seem to be tackled by the anterior pituitary and correlated mechanisms. Altschule's findings concerning increased output of pitressin during electric shock treatment seem to corroborate all this.

At this stage of the investigations our task is still to collect evidence in various fields that would prove that the effect of chronic administration of pitressin means more than increased attention on a chronic ward, more than placebo effect of daily injections of distilled water would be, or the stitch of a needle and other psychologically determined implications of such a treatment. The patient material to be presented in this report was selected to demonstrate that certain patients on the regular electroconvulsive therapy routine, who failed to respond sufficiently to that treatment alone, have shown a more adequate response when ECT was applied in combination with pitressin, thereby demonstrating that the pitressin has a therapeutic value in that treatment. Combinations of pitressin with insulin, $CO_2$,

and psychotherapy are also being used, and will be reported.

*Material and Method:*

For the present study we have reviewed our schizophrenic material, admitted within two years extending over the period from September 1950 to November 1952. The total of schizophrenic admissions was 414. Only cases that have improved to the extent that they were able to stay out of the hospital for more than a year were taken into consideration. Of these patients 39 were discharged and stayed out of the hospital without any physical treatment. When prescribing physical treatments, our policy was to put acute and serious cases on insulin treatment. Superficial conditions with much confusional or affective element were usually put on electric shock alone. These were 37 in number. Border-line conditions were tried on group therapy or $CO_2$, as well as pitressin treatment frequently associated with some group psychotherapy. Chronic cases were usually treated with a combination of pitressin and insulin or pitressin and electric shock. The total of patients on treatments other than ECT, and pitressin combined with ECT, is 66. We still have approximately 180 cases on the active file, some of them showing good remission but not being out of the hospital over one year; others showing one or more relapses, and some completely unchanged. Actual figures on the different treatments are not conclusive and do not lend themselves to valid statistical analysis. But the clinical impression remains that cases that were not thought to obtain benefit from electric shock alone, showed a more adequate response to a combination of pitressin and insulin. The number of these, however, is practically negligible at this time or in this series.

The actual course of the pitressin treatment, or a combination thereof is as follows: Patients are given daily 10 units of pitressin subcutaneously for the first 10 days. Thereafter the patient gets 10 units of pitressin every other day. When patients are on pitressin alone, a sedative effect is the first reaction. Sleep is perhaps the first symptoms to show improvement. A general feeling of relaxation and lack of excitement is seen. Further features are: fading of the delusions, reduction of pressure behind the delusions, consequently less activity on account of the distortions of thinking. There are also, of course, phenomena in the somatic field, such as paleness, increased bowel and bladder activity. Initial improvement is usually followed by a phase of reactivation of symptoms, which in chronic cases, for instance, means the re-appearance of more active symptoms of the initial phase of the psychosis, perhaps last seen years back. This condition shows oscillation of great amplitude over periods of various length and finally tapers off after several weeks. It is in this phase of re-activation when we like to introduce the combinations of the pitressin treatment. The idea is, that through the reactivation, the process has been put back into its initial stages when the efficiency of electric shock or insulin is most effective. This routine is, however, something that we worked out only after several years of experimentation, and therefore patients in the early series of reviewed cases were undergoing ECT at different phases of the pitressin treatment.

Most interesting are the ten cases of this group, who were originally placed on electric shock treatment alone because they were acute cases. They showed some improvement on that treatment, but were not sufficiently improved or were not able to maintain their improvement. These cases, when later placed on a combination of pitressin and electric shock, showed satisfactory remission and were able to adjust on the outside for at least one year. Unlike the latter, a substantial number of those who showed the same pattern in response to ECT and later to pitressin-ECT combination showed stability of improvement which was still not satisfactory to the extent that they could stay at home for more than a year.

The following is an illustrative example:

Mrs. L. H. was admitted to our hospital with a history of symptoms of alternating periods of depression and excitement characterized by sudden onset. These symptoms had been in evidence for six days. The commitment papers stated that she "acted" like a caged animal," attempted both suicide and homicide, raved, and her conversation was unintelligible. She attempted to punch her eyes out, occasionally talked about God and the Bible, cursed and fought everybody around her. The con-

dition could not be controlled with even the heaviest doses of sedative.

She was a 23 year old woman in her third month of lactation with her second child. Her pre-morbid personality had not shown anything that was patently different from what was considered average in her culture. There was some indication of greater attachment to her father than to her mother. Her marital adjustment did not show anything remarkable. Her pregnancies were uneventful and prior to her illness she appeared to be reasonably well adjusted. The family felt that after her second childbirth she had become slightly run down.

On account of the obviously catatonic excitement she was immediately started on E.C.T.'s and she seemed improved after five treatments. The improvement was not lasting, however, and after about a week of relative calm, she refused to eat and became stuporous. With four additional ECT's improvement was again noted, but this, too, lasted only a few days. She was put back on E.C.T. again, every other day. When the number of E.C.T.s reached about 20, another period of improvement was noted, not lasting however for more than a few days. It was at this time that she was put on pitressin with which she needed only one additional E.C.T. for improved behavior, satisfactory eating habits, and reasonably coherent thinking. Toward the end of the second week of pitressin treatment, she again became disorganized, started to talk to voices, and became unmanageable. At this time four additional E.C.T.s improved her condition to the extent that she was considered almost well but somewhat confused. This confusion was attributed to the electric shock. During the following week two additional E.C.T.s were given on account of minor signs of relapse, and after this she was kept on pitressin only. There was no further relapse and patient was discharged with the advice to continue pitressin at home.

It can be summarized that this acute catatonic, who did not improve with any reasonable degree of stability on electric shock treatment, when placed on a combination of pitressin and E.C.T. followed by pitressin alone showed rapid improvement with some fluctuations. These fluctuations signified the regular re-activation phase of the pitressin course. The improvement has been maintained on pitressin for the last two years.

An interesting study would be to follow our discharged cases in their home environment and check on those who had not relapsed, although the pitressin had been discontinued for some months; also to study the relapses and re-admissions to determine whether the relapses were connected with their discontinuance of the pitressin treatment. At this time however, staff inadequacies make this study practically impossible. In the cases which had been re-admitted and histories taken in the hospital, the impression was gained that a substantial number of relapses coincide with the premature discontinuance of the treatment. Therefore, at the present time when a patient leaves, his family doctor is cautioned to continue pitressin until the patient is without symptoms and shows positive signs of adequate adjustment. Three or four months later, one of the thrice weekly injections may be eliminated and the patient observed for several weeks on the twice weekly regime. If no relapse occurs, a second injection can be omitted and, if the case does not take an adverse turn in six months, the administration of the pitressin can be discontinued.

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# Sodium Amytal Narcosis in the Psychotherapy of a Sex Offender

(A Case Report)

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Conn[1] recently described hypnotherapy (one-half hour per week for a period of six months to one year) as effective in the treatment of four sex offenders (exhibitionism), where the dynamic experience of the patient knowing, accepting, and realizing himself as an authentic individual was made the core of the hypnotherapeutic experience.

This is a report on the felicitous use of a single Sodium Amytal interview during the psychotherapy of an exhibitionist whose prognosis in a previous hospital had been poor.

The patient was a 28 year old married male admitted to the Connecticut State Hospital in September 1952 after his fourth arrest for indecent exposure. He was first arrested in 1941 when, at age 17, he was discovered masturbating while peeping through a window; he was put on probation. The patient has been exposing himself and masturbating since the age of 14. In September 1950 the patient was arrested in a park for indecent exposure before two young girls. He served a sentence of 60 days for this offense. In October 1951 he was again arrested for exposing himself in his car to two young girls. At that time patient secured legal aid and with the assistance of his lawyer obtained admission to a Veterans' Hospital. He remained in the hospital six months and had been out scarcely three weeks when in July 1952 he was again arrested when he approached a strange, teenage girl and asked her if she would like to see a picture.

During the past spring and summer the patient's wife had observed some changes in his personality. His sexual interest in his wife has changed, and where at first he desired intercourse only once on each visit home from the Veterans' hospital, he later approached her several times. He rarely went out since leaving the hospital in June. Throughout the summer he seemed more quiet than usual, seemed very serious and did not laugh as he did formerly. He walked a great deal and talked little. The wife thought he seemed worried, but she was at a loss to know why, since at that time his job and income were secure. He did not show any emotional outbursts at any time, and continued to help and accept responsibilities around the home, and was in general a "good husband." Only when he was engrossed in reading did he seem "way off in a world of his own," and did not respond or pay attention if his wife spoke to him.

The patient's father is a Polish-born American citizen, and is alive and well at the age of 61. He is a quiet man, who speaks little English and therefore seldom converses with people. He drinks some, however, and on such occasions becomes jollier, more talkative, and very pleasant. Usually he attends to his own affairs, interfering with no one. The mother is of German-Polish birth, 61 and in good health. She is much more outgoing than her husband, sociable and talkative. She speaks English well. The patient is the sixth of eight children, all living, six boys and two girls. The youngest, the only one now at home, expects to marry soon. The others have already married and established their own homes. They are "all good fellows" who get along well with their families and with each other. They are all quiet people, who "settle in their own back yards," like to read and pursue quiet pastimes, and do not drink. The women of the family, the two sisters and the mother, are somewhat more emotional and inclined to be upset than the men, although the father has been concerned and depressed over patient's present difficulties.

The patient was born in 1924. There are no significant facts known about his infancy. He was healthy as a child and entered school

From Connecticut State Hospital.

at the usual time. However at about the age of eight he suffered a series of accidents and head injuries after which he had memory difficulties and headaches. He was struck and thrown by a car and seriously injured. He was hospitalized for two weeks and for several days he was unable to walk or talk or recognize anyone. A second and very similar accident occurred a short time afterward, and he received a third injury within a short period when he lost control of his bicycle and struck his head against a tree.

At school he did fairly well, attending trade school after completion of eight grades. His education was interrupted by his first arrest. He did not return to school but took a job in a factory. He has always done factory work, usually on an automatic screw machine. In 1942 his work was interrupted briefly by entry into military service, from which he received a medical discharge after a few weeks. In 1942 he met his present wife whom he married in June, 1947. She is an Italian girl who, like his mother, was Protestant and became Catholic at the time of marriage. She has been an active girl, who was restless when she had nothing to do, and always preferred to work if she could. In December 1951 shortly after patient had been arrested on a morals charge, she was very nervous about the situation, and at that time lost her first child. She became pregnant again and had a child in February 1953.

Patient has never had many friends. His hobby was fishing, by himself or with his brother, and occasionally with his wife. Sometimes he would take her and some of her friends, sitting quietly and uncomplainingly, saying nothing, but patiently baiting the hooks for all of them. He was well-liked by people because he was placid and easy to get along with, but he rarely cared to be with people or to join groups. During marriage natient never argued with his wife. She can recall only one time when patient became angry and shouted at her, apologizing shortly afterward. To the wife their sexual relationship seemed normal, but she explained that she had no relationship with any other man and was not sure what to expect. Patient retained excessive modesty, usually turning his back when he undressed. Occsionally he would look at her and would tease her because of her chubbiness. She never refused sexual relations and accepted his moods without criticism.

The patient is a well-built, young white male, very neat in appearance. On admission to the State Hospital he was depressed, kept his head bent; he had tears in his eyes and his gaze was fixed on the floor. There was observed a marked tremor of the whole body which patient tried to suppress. As was indicated in psychological studies, the patient experienced much difficulty in entering into a therapeutic relationship with the doctor. "I have no feelings. I have been unable to express my feelings as a child. I am afraid to make a decision. I have always followed the leader. Is there an easier way than this to get rid of my problem?" The patient appeared sincere about needing help, and cooperated in relating all past experiences regardless of shame felt in connection with them. He showed much "social" anxiety. He blushed easily and he stuttered. He frequently expressed wishes of improving himself, reading more to allow him to participate in conversation—to "contribute" something. Psychological testing showed a marked discrepancy between his verbal and performance abilities inasmuch as his verbal functioning falls in the average range while his performance level is in the superior range. He is also acutely aware of the meaning of a total social situation and is quickly able to size it up even to the point where his performance suggests a person who is rather shrewd and cunning. This particular ability is not obvious clinically and seems almost at odds with his apparent social awkwardness and shamefaced shyness.

The following is a summary of the material elicited during 15 psychotherapeutic sessions, including a Sodium Amytal interview. In general the patient appears to have achieved a more satisfactory heterosexual adjustment than the 18 cases of exhibitionism reviewed by Karpman.[2] This patient has been married since 1947 and the wife claims normal sexual relationships. Although patient had been masturbating since age 6-7, with a period of intensive masturbation at 11-12, he claims to have stopped masturbation a year ago. Early relationships with parents appear to have been satisfactory:

mother was allgiving; father was sympathetic. About his father patient remarks: "When I got in trouble father said it was not my fault—it was due to something going on inside of me. I know other parents would have kicked their son out of the house." Earliest traumatic incident would appear to be that of a series of falls at age 8 with prolonged loss of consciousness at one time. He remembers prolonged loss of control over his bowel sphincter so that he would "stink" in the classroom; his classmates would first look at him and then move away. These incidents may have been sufficient to give him an "organ inferiority" in Adlerian sense, and make him "timid, shy." "I was bashful—I didn't want to talk—recite aloud —or read out loud—even when I knew the answer. I had a feeling I had to get it over with. I would get tongue-tied—all fouled up. I had fear of being put on the spot." Patient could only date with neighborhood girls and went around usually with a group, where others did the talking. He remembers the first date he had with a girl classmate; he had been so afraid and bashful that he waited around outside the door for 20 minutes before ringing the doorbell. During the first interviews all his memories related to those of getting hurt or something happening to him. "I was always getting blamed for others' faults. I was unable to express my feelings as a child. My wife says I stutter when I get excited or when I want to speak too fast. I can't seem to get it out fast enough." He felt inferior because he could not dance. He has been extremely prudish, he turns his back to his wife when undressing; he remembers early shyness at undressing in gymnasium. All these feelings led to compensatory strivings. "I felt if I could not do a thing to perfection I need not bother doing it. As I was the biggest of my group I felt I should be the best in sports." One might look at his exhibitionism as a defiance of all inhibition and a compensation of sexual boldness for an underlying sense of shame.

The patient's extreme repression and inhibition during ordinary interviews noted earlier disappeared completely and quite dramatically under amytal narcosis, at which time the patient became able to talk freely and admit feeling "happy." This effect lasted after the interview and was noticed by the wife when patient called her up on the phone following the interview.

The patient's psychosexual development may be summarized as follows:

At age 6—apparently normal mutual inspection with a neighbor girl, without much feeling except a sense that they were "doing something wrong." "I must have wondered and asked her why she didn't have a penis."

However, at a later age, following the head injuries, there appears to have developed a new and irrational element in patient's sexual behavior. On his way to school he used to pass through a wooded area. At age 8-10, patient remembers seeing a girl "taking a leak." "I was watching her. She didn't know I was there. I started to masturbate. I made a noise to let her know I was there. (Note the sadistic element here.) I masturbated in front of her. Since she saw me exposed and she knew I had seen her exposed I expected her to say 'Come over' and encourage me to talk to her and play around with our sexual organs. She just stood there a few minutes, snickered and just left. I imagine I was disappointed." Following this the patient started to hang around such places as swimming pools in the city hoping to meet other girls who were "exposed"—"to satisfy my curiosity about sexual intercourse — what other fellows talked about—to see how girls were built or made." He followed the same routine of pretending to go to the bathroom and exposing his penis before he got there. He remembers several episodes of voyeurism, including that of watching his sister undress one night. He also recalls an episode that happened shortly after he had gone back to school following his accidents: he had suddenly grabbed the arm of the girl he liked and squeezed it and twisted it without any reason. He remembers while he was in the hospital he had become scared of "a man in white. I ducked under the covers and called for mother."

Still later while masturbating in his backyard he discovered a girl watching him. This girl called two other girls out and they continued to watch him and they motioned for him to continue. This episode was repeated

several times with the girls looking through binoculars at his penis. (Source of penis narcissism?)

Besides his physical injuries as a child causing a sense of inferiority other factors operating in the patient may have been: the fact of his parents' poverty which hindered his adjustment with other boys; he recalls he had to squeal on other boys so that mother would not be made to pay for a broken window. His father appears to have been distant or too busy so that patient transferred father love to oldest brother. However the patient had traumatic experiences with a friend of his brother: homosexual activities for two years. "He was 10 years older. On an annual outing of the older fellows I went along with two other young fellows. We went on our own to see what it was like. We hitchhiked. Later on this older fellow got me off in the woods alone. He took out his penis and started to take a leak. He asked me if I had ever seen one as big as his. I said 'No.' He asked to see mine. I would not let him. He started to unbutton my pants. I didn't feel right showing it to another fellow. He started playing with it. I was scared of him. He wanted me to play with his organ. I didn't want to. He offered me money—$1. I figured that that was going to be the only time. One week later he stopped his car and asked me where I was going. He insisted on taking me there. Instead he took me to an out of the way place, took out his penis and offered me more money." Mutual masturbation and fellatio activities were carried on for two years. He told his older brother about this on patient's wedding stag party.

There appeared to be a predominance of evidence pointing to patient's perversion as a regression rather than fixation. This was further indicated by the following material obtained under amytal narcosis, coincident with eradication of much inhibition: "I remember two previous occasions of going under, of feeling high. Once I was being given anæsthesia for a tonsillectomy and I got angry at the doctor for talking baby talk to me. I remember feeling high at a wedding party of my sister. I had a couple of drinks. I defied mother."

During a treatment session patient's passivity, inhibition of anger felt towards his boss and towards his brother in law were pointed out to him. Insight was expressed by patient into his excessive need to be loved preventing his expression of indignation at unjust criticisms: "If I had told my brother in law to go to hell that would be one less person I would be able to talk to." During the session after this the patient talked about his good performance in some sports—roller skating, ice skating, hockey, running. He talked about an instance when he had saved someone from drowning. Patient brought out spontaneously fear of water, fear of getting cramps when swimming any distance. He readily recognized this fear to be irrational as the fear occurred sometimes when he was in a small swimming hole. This fear was related to his inferiority feelings toward other men whom he felt were better educated, spoke better than he could, etc.

The patient was allowed outside for one day visits in November 1952 to help his wife as she was expected to deliver in December. However, towards the latter half of December the wife developed a toxemia, had to enter the hospital earlier than the expected date and finally prematurely delivered a baby who died a few hours after birth. This afforded an opportunity to allow the patient out for a longer time in order to assume the home responsibilities while his wife was sick. It was heartening to hear that not once did the old problem of exhibitionistic impulses come to his mind during this time. The patient admitted that during the first part of January 1953 while riding along in his car when he came upon a woman walking, the idea would occur to him that previously he would have experienced a desire to exhibit himself to this girl, but that he did not now. Later even this thought did not occur to him. During the month of January he was allowed out for six days a week and would only report to the therapist for an interview on Tuesday. In February 1953 the patient was approved for extended visit and in February 1954, was discharged from the hospital.

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# Can Malaria Cause Parkinsonism?

## (Report of a Case)

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Parkinsonism due to lesions caused by malaria is a rare entity in the literature, and cerebral pathology due to P. vivax infestation is also not common. It is believed that this is the first reported case of the combination as a possible syndrome.

*Incidence of Cerebral Malaria Due to Vivax*

S. F. Kitchen in his review of vivax malaria in Boyd's comprehensive survey of malaria, states that pernicious involvement of the central nervous system is not characteristic of vivax. Gordon, Lippincott, et al., in mentioning extreme drowsiness, dizziness, fainting and momentary disorientation add that, "All these symptoms are probably manifestations of an acute infection rather than signs of cerebral malaria." Most and Hayman found no indication of plasmodial localization in the manner of P. falciparum but noted severe headache, delirium (nonspecific reaction to fever), acute psychosis (quinacrine toxicity), severe neck stiffness at onset of paroxysms and convulsions, in three patients. This they attributed to the fever or to underlying disease of the brain in each case. These reports all conform to those of most earlier writers. On the other hand, Romanenko reported two vivax attacks in which the patients became comatose; Tarajev, Gontayeva and Rotenburg reported a fulminating form of vivax in children and young adults in Central Russia. They reported a syndrome found in 17 patients with rapid onset, severe headache, vomiting, convulsions, foaming at the mouth, coma, and Cheyne-Stokes respiration with death ensuing in two to three hours. Twelve of their 17 cases revealed P. vivax. However, they considered this syndrome a host reaction rather than due to any particular vivax strain. Fitz-Hugh, Pepper and Hopkins reported that cerebral malaria occurred in 140 cases in a series of 6,059 cases of malaria in a U. S. General Hospital in India. Of these, plasmodium vivax was the causative organism in five, P. falciparum in 88. Horn and Karelitz writing of a series of 1,155 cases of malaria in the Mediterranean Theater noted nine cases of the cerebral form. In two of these, the causative organism was the tertian, in six the falciparum, and in one case no organism was found.

A general discussion of the cerebral manifestations and forms of malaria is not within the scope of this communication. Masson, reviewing the literature in 1924, mentioned vivax forms as rare causal factors but quoted no references and devoted his discussion of cases to falciparum forms. In Turner's review 12 years later, vivax is not mentioned. Standard neurological textbooks such as that of S. A. K. Wilson (1940 edition), either make no mention of vivax forms or do not differentiate the types as of any great significance although usually the falciparum is referred to.

*Incidence of Parkinsonism Due to Malaria*

In 1817 James Parkinson applied the term "paralysis agitans" to a disorder characterized chiefly by muscular rigidity and a peculiar tremor. Today, the condition is recognized as being caused by hereditary, idiopathic, arteriosclerotic, traumatic, toxic and infectious (postencephalitic) factors.

In the standard neurology texts malaria is, with few exceptions, not listed as an etiological factor either as an infectious, a toxic or a traumatic precipitant.

A review of the literature reveals only the following reported cases. From the information available none of these cases are ascribed specifically to the P. vivax form of infestation.

1. Lemoine and Chaumier reporting in 1887 described a 65 year old male patient with a tremor like that noted in paralysis agitans, associated for several years with dizzy spells and headaches. He presented none of the other symptoms of the syndrome. Tremors predominated on the right extremities and gradually during the long period of observation

From Yale University, Child Study Center

the patient developed a definite insanity.

2. Conti is cited by Anderson and by Wilson to have "noticed in the highly malarious Sardinia, also, the Parkinsonian syndrome" (1910).

3. Chavigny is cited by Anderson to have recorded the Parkinsonian syndrome in 1912, ". . . a également été attribuée parfois a la malaria."

4. S. A. Kinner Wilson reported a full blown case of paralysis agitans following malaria by one year in a 35 year old male (1921).

5. Chini reported a case observed for four months which exhibited a typical severe Parkinsonism but for the tremor which was always missing. This occurred in a 48 year old male (1935).

6. Schilf recorded the case of a 42 year old male who had had malaria 10 years prior to the onset of nervous symptoms.Headache was the first symptom, with later rigidity, typical posture, akinesia, marked ptyalorrhea, laughing and crying spasms, but no tremor (1938).

7. Effron and Denker writing in 1950 on the clinical evaluation of certain drugs in Parkinson's disease indicated that the Neurological Service of Doctor Foster Kennedy (from which their cases were taken), does recognize the disorder as a definite entity. They mentioned that seven of the cases in their series were "classified as syphilitic, malarial, or traumatic." No details of any of the cases were given.

### *Pathology*

The pathological anatomy of malaria is extensively reviewed with adequate bibliography by Clark and Tomlinson in their survey of malaria edited by Boyd.

The pathological anatomy of the Parkinsonian state is even at this date not entirely clear. No constant pathological substrate may be determined from the cases reported in the literature. Cases usually presented contain references to the substantia nigra and the corpus striatum. As is well described in the review by Heath, these areas are not invariably involved and there are frequent cases of multiple lesions. Currently it is fashionable to ascribe the syndrome to lesions which release inhibitions imposed by the affected structures so that the rigidity and tremor seem to be due to uninhibited impulses from other areas. However, this unsettled problem is not within the scope of this communication.

### *Case Report*

A 31 year old soldier with 13 years military service was admitted to Tripler Army Hospital on December 27, 1951 with chief complaint that his right arm and leg had been shaking ever since he had had malaria in 1944. The patient related that in 1942 he had his first attack of malaria on Guadalcanal, and it lasted four days. It was characterized by shakes followed by chill and a fever rising to 105°. He had chills twice a day for four to five days and took atabrine and quinine during this period. His next malarial episode was over a year later in 1944. This began with a temperature of 105° lasting over a day. Four to five days later he had a second attack characterized by chill and fever, and a week following he had a third episode. The attacks subsided with quinine but one week later he again had a temperature of 105° with shaking and chill lasted 4 to 5 hours. This recurred the following night and for three successive nights. Subsequently, he was hospitalized for two weeks during August of that year, and a diagnosis of tertian malaria was made from slide examination at that time, and once again in September. On this last occasion he was found to have an enlarged spleen also.He was treated during these hospitalizations with atabrine. Eleven days following his September hospitalization, he had another attack which was treated with quinine and the treatment continued for 5 days. Two weeks subsequent to this, and again two weeks thereafter he had single episodes characterized by fever, chills, and shaking. These were stopped finally by continuous quinine. He took the latter for a period of some 90 days through a misunderstanding of instructions of the physician. After about the fourth attack in this sequence in 1944, he noted a shaking of the right arm and leg which lasted two to three hours. He then noted that for the next 4 to 5 years when excited, he would have 1 to 2-hour periods of tremor. He also experienced a small amount of stiffness which was especially noticeable when he was supposed to be swinging his arms in parades. His next malarial episode occurred in 1947 when he was in Trinidad. This was characterized by no elevation of temperature, no general chill and no shaking; however, he felt a chill in the back of his legs. At this time a smear again verified that malaria was causing his malaise and chill. Again, the diagnosis was of P. vivax. He was treated with quinine for about one week. He was hospitalized from October 1949 to March 1950 because of tremor in the right arm and leg. Diagnosis of conversion reaction was made and he was given scopolamine exclusively for one month, but this produced no difference in the symptomatology. His second hospitalization for tremor as such, was from February to March 1951 and at this time he was placed on artane for about four months. Slight improvement was noted during the first month but no change during the subsequent three months. His background regarding his personal and familial history is essentially noncontributory. He gives no history of any influenzal period, nor period of exposure to any of the poisons which have been known to cause a Parkinson-like syndrome although he has had the usual number of colds. In 1939 he had pneumonia without any known sequelae; otherwise his general health had been excellent. A complete psychosexual history was also unremarkable. Repeated mental examinations were essentially within normal limits and he was noted to be a rather phlegmatic individual.

*Physical Examination*

Complete physical examination, including neurological examination revealed a well nourished, well developed, white male in no acute distress with a facies showing only a small amount of emotion and with infrequent eye-blinking. He presented a coarse rhythmic tremor of the right hand at rest, which he can control by holding the hand. It is markedly exaggerated by intention. There is no evidence of weakness. A similar but less coarse tremor is noted in the right foot and leg. There is spasticity of the right extremities with increase of the deep tendon reflexes of that side. Abdominal and cremasteric reflexes are brisk and equal. There are no pathological reflexes. He walks with a slight spasticity of the right lower extremity tending to drag the toes of that foot, and holds the right arm closely by his side. Festinating gait is not noted. When the two arms were held extended before him with eyes closed, it was noted that the right arm deviated inward and downward. When the shoulders were shaken by the examiner, it was observed that the left arm swung freely but the right was held rather rigidly and did not swing beyond about ten degrees. When the patient stood at attention with eyes closed and was pushed backward suddenly the left toe rose from the ground to help balance him but the right foot remained flat and stationary. When he was asked to write, there was gross tremor to the characters and they were of a wavy and corrugated pattern, similar to the signatures seen in Parkinsonian patients. It was noted that he held the writing arm, which was his right, with assistance from the left hand and that there was no difference in the size of the characters as he continued to write. On mechanical stimulation of the right leg, a clonus-like tremor was noted. This was of an extended type and was noted to be nearly but not exactly synchronous with the tremor of the right arm. All sensory modalities were symmetrical and intact and there was a slight and questionable tremor of the closed eyelids. There was a slight, questionable bilateral exophthalmos and slight and questionable excessive oily skin secretions about the face.

The remainder of the neurological examination was completely physiological and this included an ophthalmoscopic and visual field examination. The frequency of the tremor was measured by means of the electrical device pictured in figure 1. This consisted of an ordinary iron nail, previously magnetized, attached to the tremulous extremity by adhesive tape as one part. The other portion of the device was a simple coil of insulated electrical wiring attached to two of the electrode connections of the channels of an electroencephalography machine. (An electrocardiographic machine would have served the same purpose.) As the moving extremity caused interruptions in the magnetic field, electromotive forces were set up in the coil and recorded by the ink writers as steady waves which could be easily counted. Since for each tremor the field of electrical activity was disturbed once, by the movement in each direction of the piece of iron, one-half of the number of recorded ink waves represented the frequency of the tremor in a given time interval. In this case, the frequency was a consistent six per second.

*Laboratory Studies*

Electrocardiogram, routine chest x-ray, urinalysis, serological examination and a series of routine skull x-rays were within normal limits. Electromyographic testing revealed no evidence of lower motor neuron lesions. Independent interpretation of the electromyographic tests by Doctors Alex Arieff and James G. Golseth also noted definite e.m.g. evidence of spasticity. Basal metabolism was recorded as —7 per cent Blood cholesterol determinations on various days were 227.5, 406, 334, 322, and 340 mg/100 ml. Cholesterol esters on the same day as the 227.5 mg/100 ml was 162.8 mg/100 ml or 71.5 per cent.

Other blood determinations were creatinine 1.0, phosphorus 3.4, calcium 9.4, B.S.P. test negative, non-protein nitrogen 33.5, urea nitrogen 17.7, albumin 5.0, globulin 1.7, and total blood protein 6.7. A five hour glucose tolerance test curve was 104, 136, 108, 98, 64, 80, 78 with all urine samples negative for positive sugar determinations.

A pneumo-encephalogram done with approximately 125 cc of oxygen was reported by the Radiologic Service of Tripler Army Hospital as, "The left lateral ventricle is dilated, particularly in its anterior portion. Although the films are not exactly true views, no displacement of the ventricular system as a whole is suspected. The third ventricle is midline but is dilated symmetrically. The lateral wall of the anterior portion of the left lateral ventricle is flatter than normal. The posterior and temporal horns are not unusual. The fourth ventricle is questionably visualized and if this is the fourth ventricle, it is normal. Impression: Atrophy of the left side in the region of the caudate nucleus, causing localized dilatation of the left lateral ventricle. The cause of the third ventricular dilatation is unexplained."

Figure 2 is a reproduction of one of the x-ray films.

An electro-encephalogram revealed a well established 11 per second basic alpha pattern with no evidence of focal or paroxysmal activity. There was very little change on overbreathing and the impression was of a normal EEG tracing.

*Course in the Hospital*

During the patient's hospitalization he, at no time, revealed any evidence of any psychotic or severe psychoneurotic process. He was placed on benadryl by mouth, 100 mgm t.i.d., and he noted very early a marked subjective improvement in his spasticity; objectively a very minimal improvement was observed. He had at the time of this writing been returned to full active duty at this installation and was being followed as an outpatient. It is interesting to observe that his handwriting shows slight improvement within an hour after the indigestion of benadryl and that the improvement

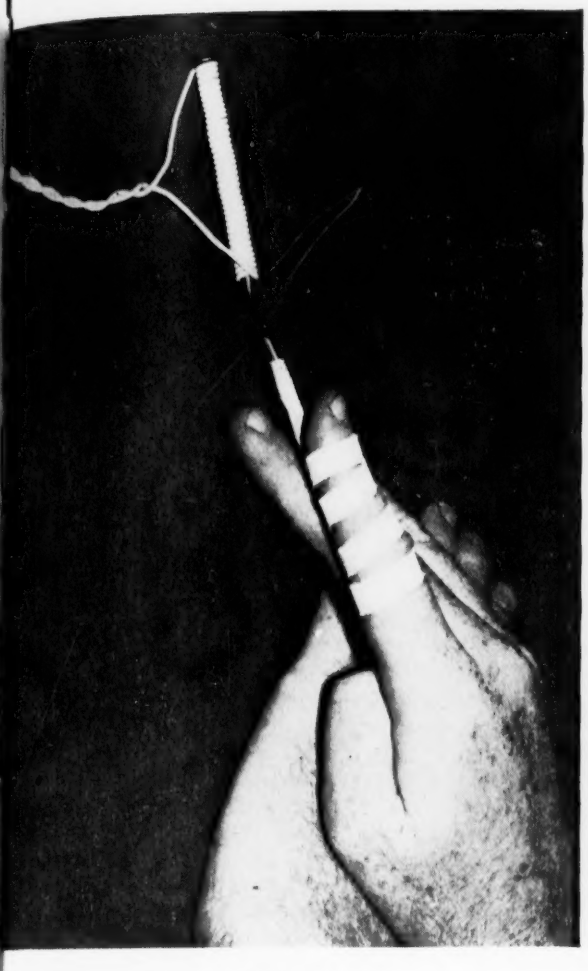

*Fig. 1.*

*Fig. 2.*

seems to subside when the drug is discontinued or wears off.

### *Comment and Summary*

The case herein reported is not entirely unequivocal in several respects. In spite of the negative history and of the juxtaposition in time of the tremors with the malarial episodes, the possibility of this being in actuality a syndrome which is due to a post-encephalitic process cannot be completely excluded. The possibility that this individual may have had a mixed malarial infection is also present. Serological tests for malaria as developed in the future may one day decide this question.

On the other hand, the history, age at the present time and at the time of onset, plus the clinical course, certainly point to the presumptive diagnosis. Lack of a familial history, lack of a history of exposure to chemicals such as are usually associated with the syndrome, youth of the individual, and lack of history of trauma or arteriosclerotic changes, all weigh on the positive side.

In summary, this report has reiterated the facts of the infrequent mention of plasmodium vivax as an etiological organism in cerebral malaria and has presented a case of hemi-Parkinsonism possibly caused by P. vivax infestation in a 31 year old white male. An enumeration of the available literature on previously reported cases has also been included.

*Acknowledgment:* The author wishes to express his appreciation and thanks to Doctor A. E. Caldwell of the Army Medical Library for her assistance in translating some of the reference material and to Sgt. Wilber L. Hurr of Tripler Army Hospital for his technical assistance.

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# Book Reviews

**PSYCHOSOMATIC CASE BOOK by Roy S. Grinker, M.D., and Fred P. Robbins, M.D. The Blakiston Company, Inc. 346 p. Price: $6.50 (1954).**

The authors have attempted in a scholarly manner, to emphasize the psychiatric disciplines and their associated relationship to physical disorders. They have presented, through a medium of a generous sampling of clinical case material, the correlative situations and problems of discriminative diagnosis of the numerous and varied bodily dysfunctions as these concomitant pathophysical reactions reflect or may become diagnostically referable to endured stressful situations.

The book is methodically subdivided into sections which categorically consider the psychosomatic concept generally, the presentation of special syndromes, the question of therapy as to plan, methods, and doctor-patient relationship.

The volume contains a plethora of psychosomatic case histories with illustrative amplifications of the pathology of psychobiological situations, each of which is discussed from the standpoint of psychological disturbance and its concomitant physiological response.

The book is well documented with references at the close of each chapter, as well as with a general bibliography at the end of the last chapter. The index which follows, is both comprehensive and well arranged, and consolidates references to authors as well as to the textual subject matter.

It may well be considered a psychosomatic case book, and is comprehensively written in language which can be readily acceptable and made utilizable by those in psychiatric and psychological orientation and/or study at its many levels of interest.

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**PSYCHOLOGICAL DISORDER AND CRIME, by W. Lindesay Neustatter, M.D., B.Sc. (psy.), M.R.C.P. Christopher Johnson, London; 248 p. (1953).**

The author deals with the varied forms and severities of psychological disorders, their traceable relation to genetics and environmental factors, and discusses their social significance. He cautions against the indiscriminate use of the term 'psychological illness' unless the latter meets two basic tests: (a) 'the existence of some psychological disorder which could have been diagnosed independently of any crime being committed,' and (b) 'that a relationship between this and the crime can be established.'

The book contains a concise yet intelligently described practical explanation of the McNaghten

Rules in applicable case material under discussion. Therewith the author bears down on the frequently unrealized element that the Court's decision as to responsibility for a criminal act is in no way dependent upon a physician's private views of what constitutes responsibility.

In his chapter on 'Guilty But Insane' the author defines and differentiates the concepts of insanity in the *medical* and *legal* sense, and indicates how in the latter situation, the individual may still be responsible for his acts. The various psychotherapeutic modalities are descriptively discussed, and the main physical methods described, include leucotomy in intractable states of tension, in marked obsessions, in severe chronic anxiety situations and in the schizophrenias. The neuroses are categorized and their criminological relationships exemplified. The author calls attention to the commission of civil offenses rather than crimes of violence, which offenses may be usually indulged in by hypomanics during states of exuberance. The reader is equally apprised of capital crimes committed as a tragic outcome of depression; and the author cites instances of killings by those who foresaw the imagined sufferings of their loved ones whom they destroyed, or, when unable to face life and during a suicidal act, feel they must also take the loved one with them.

In commenting on the medico-legal aspects of amnesia and fugue states, the author advises that this problem is essentially bound up with the question of criminal responsibility, and inquiry whether the individual knew what he was doing at the time, both as to the nature of the act and its wrongness. The author well points out that as the memory loss in hysterical amnesia is virtually always the aftermath of getting into trouble, its finding becomes irrelevant to the question of guilt, and its psychiatric argument therefore impresses the Court little, if at all. Of course, genuine disturbances of consciousness as in the fugues of epileptic and schizophrenic states, are another matter and thereat the McNaghten Rules may apply.

The book discusses with practical clarity the psychopath who, because of his chronic conflicts with the law, poses a difficult problem to all who have to deal with him. The author postulates that although psychopaths possess an intellectual ability to perceive the consequences of their acts in cases where no anatomical or physiological abnormalities are found, their deeper ability to form conditioned inhibition is lacking. He contrasts this with situations following head trauma or aftermaths of cerebral disease where the individual, although knowing the nature of his deed and its wrongness, nevertheless acted as an automaton with a damaged brain, whose judgment was faulty, who lacked the normal person's ability to exercise self-control and who could not be influenced by morality or fear.

The problem of sexual perversion is recognized and the author adverts to the popular prejudice of the socially less harmful perversions which often arouse greater feelings of repugnance than the more dangerous ones. He reflects upon the probability of attitude of deep-seated herd instinct, of dislike of the unusual, and suggests advantageous adoption of Kraft Ebing's dispassionate attitude that the pervert, like the infectious patient who requires segregation in the public interest, should be regarded as a pathological rather than as a moral problem. Among the perversions of criminal importance the offenses and peculiarities of voyeurism, exhibitionism, the sadistic acts whose dangerous forms culminate in the gruesome acts of strangulation, stabbing and other mutilations, transvestism (fetishism) and sexual offenses against children, are treated in some detail. As to therapeusis within this category, the author feelingly states, and this reviewer concurs, that far from bringing about a changed attitude on the part of the legal profession, the absurd therapeutic claims on the part of some medical witnesses, has merely served to bring psychiatry into an unfavored situation. The author questions the strangeness of the fact that while a fine may be regarded as adequate punishment for indecent offenses other than sodomy, the latter is punished often by years of imprisonment. He properly asks by what process of logic such a vast difference in moral culpability between the two similar practices exists. With equal force it is argued that if protection of society against sexual abuse is the measure, why is there no penalty for those heterosexuals who spread syphilis with all its consequences. The author feels that no sexual assault should be condoned because the aggressor happened to be a pervert, since the protection of the victim must have priority over the welfare of the pervert; but where consenting adults are involved, punishment hardly seems just or humane under a tolerant and unprejudicial view, unless it can be shown that either the individual or society has suffered.

The subject of murder is discussed from many angles of relevance. There are those killers whose murderous acts were incident to the commission of another crime or were done in self-defense; where the homicide was the result of clear motive; where it was associated with a strong sexual element; or where it was the act of a psychotic individual who was either unfit to plead at trial or was found to be psychotic at or subsequent to trial. Of particular forensic interest are the author's discussion of the acts of murder committed by epileptics, the murders perpetrated by psychopaths, the killings by dangerous perverts during sexual frenzy, the murders committed by mental defectives, the impulsive killings carried out by schizophrenics, the murders of loved ones by depressed individuals, the killings at the hands of those suffering from organic brain disease, and the murders committed by paranoid individuals. The latter, who may refuse to plead psychosis at trial, can be more concerned with establishing their sanity and proving their ideas to be correct, than with the risk of execution. In dealing with suspicious, aggressive and intelligent paranoiacs who readily shelter behind their legal rights, the psychiatrist is confronted with a most difficult task and the onerous responsibility where the matter of life and death may rest on his decisions.

Lastly, where there is absolutely no defense, the individual charged with homicide may attempt to simulate a psychosis or other psychiatric disorder. Here again the province of psychiatry is called upon to adjudicatively balance simulation against reality and to determine between fact and fiction.

Rspecting juvenile delinquency the author's theory is that the present social changes are responsible for the differing outlook and declining standards of honesty. Today, especially amongst the younger generation, the poor, who acceptably kept within their places in previous times, are no longer willing to do this. They no longer work at dull or uncongenial tasks, but prefer the easy and flashy way of making money quickly. The problem child coming from a repressive home setting, when receiving freedom reacts thereto by misusing it, and this appears to take root among the unstable elements who are ever ready to feel aggrieved and to protest that they are being taken advantage of. It is this growing insistence on the rights of the underdog that may be productive of a frame of mind in which they feel justified into taking the law into their own hands. This changing social outlook may also be a factor in laxer discipline, with many working-class parents unconsciously adopting an attitude that disciplining their offspring is only for the benefit of another class of society. The author further suggests, and with justification, that some delinquent children's acts are analogous to neurotic symptoms manifested in anti-social form; and that most children who get into trouble, if put on probation, or, if necessary, are removed from bad home influences and bad company, will cease their delinquencies.

As to legal disposition of juvenile delinquents, the author refers to probation as the commonest corrective measure employed, with acceptance by the Court of the psychiatrist's advice. The author is of the opinion that where delinquency is a reaction to deprivation of affection or unfair treatment, punishment will do more harm than good, and improving the environment together with psychotherapy will, if successful, remove the cause of the delinquent behavior. But where children who, like adults, will break the law provided they think they can get away with it, and are apt to regard probation flippantly, the author suggests that a fortnight of custodial suspense, which will cause the delinquent to wonder if he is 'going to be sent away' will bring him up sharply to the realities of the situation.

The author in his concluding chapter on 'Treatment or Punishment' suggests that the physician 'often cannot give as exact an answer as lawyers would like, for doctors are faced with the difficulty that nature makes the rules, while lawyers can by clever interpretation try and make the rules fit their purpose' . . . There are difficulties to be overcome on both sides and their respective prejudices and suspicions arise from a lack of first hand acquaintance with the nature of the work and the problems of the other party.

The book is a significant contribution to the subject, is written in simple language, and contains in organized form only such sufficient technical terminology as will make it useful to the judiciary, legal, probational and other personnel engaged in the problem of penalogy, as well as to psychiatrists concerned with the medicolegal aspects of delinquency and crime, and psychotherapeusis directed toward social reconstruction. The book is practical, and brings into clearer forensic focus the relationship between psychological disorders and the aspects of criminality.

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**PSYCHOLOGY, THE NURSE AND THE PATIENT. 2nd Edition. By Doris M. Odlum, M.R.C.S., L.R.C.P., D.P.M. Dip. Ed. Philosophical Library. 168 pages. $4.75.**

This revised edition deals with a number of the human problems which arise in nursing. Apparently it is directed toward nurses who are to take "final examinations for State Registered Nurses" in England. It is a small book and contains 19 short chapters, some consisting of only one or two pages.

Beginning with a chapter entitled "How Psychology Can Help in Nursing," it passes quickly on to "The How and Why of Human Behavior," "Inborn Mental Factors," "Modification of the Inborn Mental Factors," etc., down to a final chapter on the "Treatment of the Psychoses."

Undoubtedly the book has served its purpose or it would not have been reprinted, but one wonders just how much value it will be to nurses in this country. True enough, the nurse deals with people, no matter what country she works in, but this volume seems to be rather a curious mixture of elementary concepts and involved ideas.

There are many statements which could be challenged and there is a tendency toward the use of rather sweeping generalities. Is Jung's name pronounced Young? (page 25). Is the ideal personality for a nurse tough (page 108), rather than tender by her own definition? Are the age groupings so pat as is indicated in the discussion of middle life, etc.? If this sounds like carping and minor criticism, it is not meant to be. The idea is good and I am sure the book will do some good, but it does not quite fill the bill and $4.75 is a rather high price for a small book of this size with no illustrations.

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